



Designation: A1113/A1113M – 20^{ε1}

Standard Specification for Corrugated Steel Structural Plate, Polymer-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches¹

This standard is issued under the fixed designation A1113/A1113M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

^{ε1} NOTE—Editorial corrections were made to Section 2 and Table 2 in April 2021.

1. Scope

1.1 This specification covers corrugated steel structural plate, polymer-coated, used in the construction of pipe, pipe-arches, arches, underpasses, and special shapes for field assembly. Appropriate fasteners and accessory materials are also described. The pipe, arches, and other shapes are generally used for drainage purposes, pedestrian and vehicular underpasses, and utility tunnels.

1.2 This specification does not include requirements for bedding, backfill, or the relationship between earth cover load and plate thickness of the pipe. Experience has shown that the successful performance of this product depends upon the proper selection of plate thickness, type of bedding and backfill, manufacture in the plant, and care in the installation. The purchaser must correlate the preceding factors and also the corrosion and abrasion requirements of the field installation with the plate thickness. The structural design of corrugated steel structural plate pipe and the proper installation procedures are described in Practices [A796/A796M](#) and [A807/A807M](#).

1.3 *Units*—This specification is applicable to orders in either inch-pound units (as A1113) or SI units (as A1113M). Inch-pound units and SI units are not necessarily equivalent. SI units are shown in brackets in the text, but they are the applicable values when the material is ordered to A1113M.

1.4 This specification references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of this specification.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

¹ This specification is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.17 on Corrugated Steel Pipe Specifications.

Current edition approved March 1, 2020. Published March 2020. DOI: 10.1520/A1113_A1113M-20E01.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- [A36/A36M Specification for Carbon Structural Steel](#)
- [A370 Test Methods and Definitions for Mechanical Testing of Steel Products](#)
- [A449 Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use](#)
- [A563 Specification for Carbon and Alloy Steel Nuts](#)
- [A563M Specification for Carbon and Alloy Steel Nuts \(Metric\)](#)
- [A751 Test Methods and Practices for Chemical Analysis of Steel Products](#)
- [A761/A761M Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches](#)
- [A796/A796M Practice for Structural Design of Corrugated Steel Pipe, Pipe-Arches, and Arches for Storm and Sanitary Sewers and Other Buried Applications](#)
- [A807/A807M Practice for Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications](#)
- [D522/D522M Test Methods for Mandrel Bend Test of Attached Organic Coatings](#)
- [D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents](#)
- [D610 Practice for Evaluating Degree of Rusting on Painted Steel Surfaces](#)
- [D638 Test Method for Tensile Properties of Plastics](#)
- [D968 Test Methods for Abrasion Resistance of Organic](#)

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

Coatings by Falling Abrasive

- D1654** Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
- D2794** Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
- D3359** Test Methods for Rating Adhesion by Tape Test
- D4541** Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- D6677** Test Method for Evaluating Adhesion by Knife
- D7091** Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals
- E29** Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- F568M** Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners (Metric) (Withdrawn 2012)³
- F1554** Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
- G62** Test Methods for Holiday Detection in Pipeline Coatings
- 2.2 *ANSI Standards*:⁴
 - B18.2.1** Square and Hex Bolts and Screws, Inch Series
 - B18.2.2** Square and Hex Nuts
 - B18.2.3.4M** Bolts, Metric Heavy Hex
 - B18.2.4.6M** Hex Nuts, Heavy, Metric
- 2.3 *AASHTO Standard*:⁵
 - LRFD** Bridge Design Specifications
 - Standard Specifications for Highway Bridges**
- 2.4 *AWS Standard*:⁶
 - AWS D1.1/D1.1M** Structural Welding Code
- 2.5 *SAE Standard*:⁷
 - SAE J2334** Laboratory Cyclic Corrosion Test
- 2.6 *GM Standard*:⁸
 - GMW14872** Cyclic Corrosion Laboratory Test

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

- 3.1.1 *arch*, *n*—a part circle shape spanning an open invert between the footings on which it rests.
- 3.1.2 *box culvert*, *n*—rectangular box with a long-radius crown and short radius corners, and having either a full invert or footings.
- 3.1.3 *circumferential flange connection*, *n*—a circumferential seam for structural plate that is connected through a flange along the edge of the plate; circumferential flanges are cold-formed.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.

⁶ Available from American Welding Society (AWS), 8669 NW 36 St., #130, Miami, FL 33166-6672, <http://www.aws.org>.

⁷ Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, <http://www.sae.org>.

⁸ Available from General Motors (GM), <https://global.ihs.com>.

3.1.4 *circumferential reinforcing member*, *n*—a structural section bolted to a structural plate structure, parallel to the corrugations, to provide additional strength or stiffness.

3.1.5 *circumferential seam*, *n*—a connection seam along the edge of the plate parallel to the corrugation.

3.1.6 *fabricator*, *n*—the producer of the components for the finished product.

3.1.7 *flat plate*, *n*—sheet or plate used to fabricate structural plate.

3.1.8 *longitudinal flange connection*, *n*—a longitudinal seam for structural plate that is connected through a flange along the edge of the plate; longitudinal flanges are welded to structural plate.

3.1.9 *longitudinal seam*, *n*—a connection seam along the edge of the plate perpendicular to the corrugation.

3.1.10 *manufacturer*, *n*—the producer of the flat plate and accessories.

3.1.11 *pipe*, *n*—a conduit having full circular shape; also, in a general context, all structure shapes covered by this specification

3.1.12 *pipe-arch*, *n*—an arch shape with an approximate semicircular crown, small-radius, corners, and large-radius invert.

3.1.13 *pipe, horizontal ellipse*, *n*—an elliptically shaped pipe with the horizontal diameter approximately 25 % greater than the nominal diameter.

3.1.14 *pipe, vertically elongated*, *n*—an elliptically shaped pipe with the vertical diameter up to 10 % greater than the nominal diameter.

3.1.15 *purchaser*, *n*—the person or agency that purchases the finished pipe structure.

3.1.16 *special shape*, *n*—a shape, other than described elsewhere in this section, suitable for fabrication with structural plate.

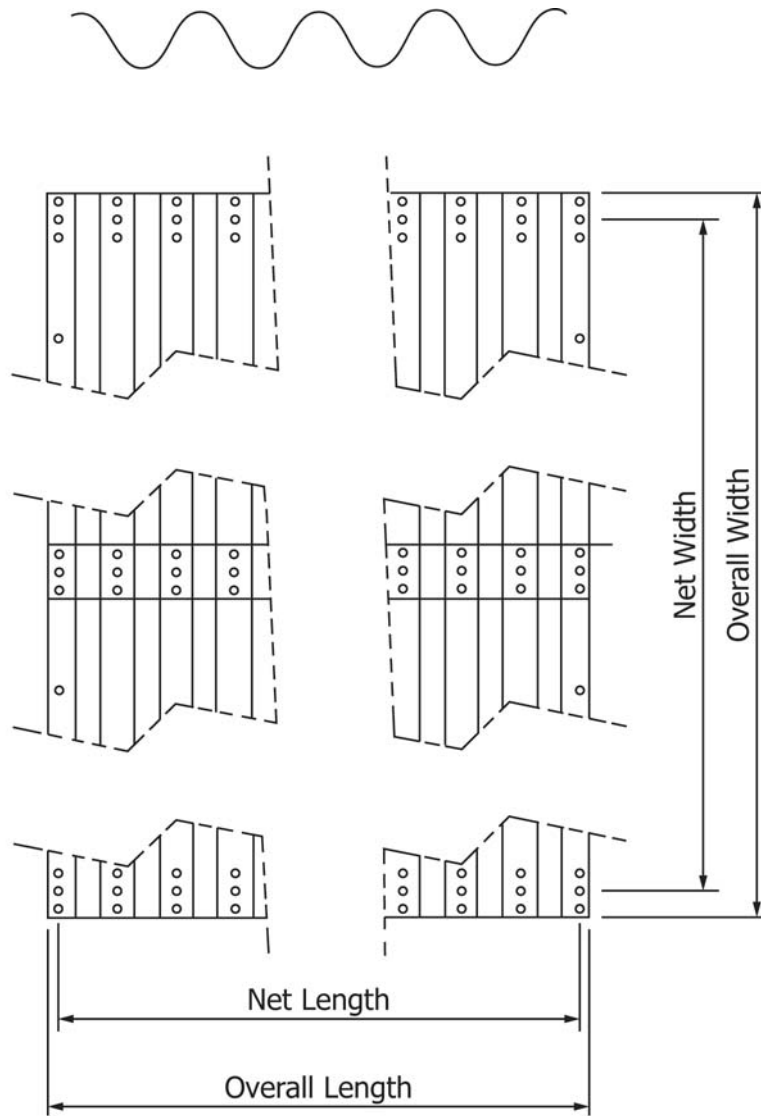
3.1.17 *structural plate*, *n*—a corrugated and curved plate which is field assembled with other structural plates to form the required structure.

3.1.18 *vehicular underpass*, *n*—a high arch shape with an approximate semicircular crown, large-radius sides, small-radius corners between sides and invert, and large-radius invert.

4. Connection Classification

4.1 *Lapped Connections*—The corrugated steel structural plate shall be fabricated with any of the corrugations in 6.2 with bolted lap seams in both circumferential and longitudinal directions. See Fig. 1.

4.2 *Flange Connections*—The corrugated steel structural plate shall be fabricated with 15 by 5½ in. [380 by 140 mm] corrugations with bolted flange seams in both circumferential and longitudinal directions, oriented such that after curving, all flanges are on the inside of the structure. See Figs. 2-4. For arch anchorage plates, the longitudinal flange along the bottom



Note: Seam Hole Pattern Varies With Corrugation Profiles

FIG. 1 Layout of Structural Plate with Lapped Connections

edge may be omitted and bolt hole patterns furnished the same as that for structural plate with lapped connections.

5. Ordering Information

5.1 Orders for material under this specification shall include the following information as necessary to adequately describe the desired product:

5.1.1 Name of material (corrugated steel structural plate and accessories),

5.1.2 Description of structure (see Section 3),

5.1.3 Number of structures,

5.1.4 ASTM designation and year of issue, as A1113 – __ for inch-pound units or A1113M – __ for SI units.

5.1.5 Type of connections if other than lapped (see Section 4),

5.1.6 Dimensions of structure (diameter or span and rise, and length, and so forth) (see 9.2 and Note 6),

5.1.7 Thickness of plate (see 9.1), and for the 6 by 2 in. [150 by 50 mm] corrugation, the type of steel in accordance with 6.1.3 and Table 1,

5.1.8 Description of corrugations (see 7.2),

5.1.9 End treatment (bevel, skew, grade or slope corrections, or other special provision if required by the project plans or specifications),

5.1.10 Seam bolt size and number per corrugation, if different than the minimums specified (see 7.4 and Tables 2-4),

5.1.11 Special requirements (including reinforcement locations, shapes, and thicknesses), if required, and

5.1.12 Certification, if required (see 13.1).